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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/671,887

09/29/2003

Fred Gehrung Gustavson

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EXAMINER

NGO, CHUONG D

ART UNIT

PAPER NUMBER

2193

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/671,887	<b>Applicant(s)</b> GUSTAVSON ET AL.	
	<b>Examiner</b> Chuong D. Ngo	<b>Art Unit</b> 2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-2 and 4-27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In particular, the specification only discloses the size of the cache about  $NB^2$  in relative to the block size. However, the specification has never disclosed the cache being square with one the dimension (side) equal  $NB$  and the other dimension also equal  $NB$ , or disclose any dimensions for the cache. The specification clearly does not disclose or provide support for the claimed features that the data block has a first dimension being larger than the first dimension of the cache and a second dimension being smaller than a corresponding second dimension of the cache as recited in claims 1, 15 and 19, or a dimension of the block is larger than any dimension of a working are of the cache as recited in claim 10.

3. The amendment filed on 02/03/2007 introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the

Art Unit: 2193

invention. The added material which are not supported by the original disclosure are the recitation in claims 1,15 and 19 that the data block has a first dimension being larger than the first dimension of the cache and a second dimension being smaller than a corresponding second dimension of the cache, and in claim 10 that a dimension of the block is larger than any dimension of a working area of the cache.

Applicant is required to cancel the new matter in the reply to this Office Action.

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1,2 and 4-27 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-9 and 19-27 are directed to a computer implemented method that merely involve manipulations and calculations of data values, claims 10-14 are although directed to an apparatus, broadly encompass a general computer implementing the method, and claims 15-18 are directed to a computer program for implementing the method. In order for a claimed invention that is directed to such a computer implemented method that merely involve manipulations and calculations of data values, or a computer or a computer readable medium having a computer program implementing the method of calculation to be statutory, the claimed invention must accomplish a practical application, and is not directed to a preemption of a calculation and/or manipulation data. That is the claimed invention must transform an article or physical object to a different state or thing, or produce a useful, concrete and tangible result and

Art Unit: 2193

not cover every substantial practical application . See State Street 47 USPQ2d, Benson 175 USPQ , and “Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility”, OG Notices: 22 November 2005. It is clear from claims 1,2 and 4-27 that the claims merely involve calculations and manipulations of data such as storing data in a memory in a particular manner, for example, in claim 1, and executing at least one matrix subroutine, for example, in claim 2. Neither the data stored in a cache nor the result of the executing matrix subroutine has a real world value. Further, the claimed invention does not transform an article or physical object to a different state or thing. The inputs are numbers and the results are also numbers. The result of the invention is merely numerical values without a practical application recited in the claims to make the result to have a real world value, and thus is not useful, concrete and tangible. Therefore, the claimed invention is directed to non-statutory subject matter as the claims fail to accomplish a practical application. Further, since the claims appear to cover every substantial practical application, they are also directed to a preemption of the claimed manipulation and calculation of data.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 5-10, 12-16,18,19,21-23 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lao et al. (2003/0088600).

As per claims 1,10,12,15,19,23 and 27, Lao et al discloses an execution a matrix subroutine (matrix transposition) in a computer including storing data contiguously for a matrix subroutine call in a computer memory in an increment block size that is based on a cache size of said computer (see paragraph [0071] bridging page 4 and 5). Lao clearly discloses that the guide for optimally partitioning a matrix is to use large contiguous blocks but make them small enough to fit in the cache (lines 2-3 of the paragraph, see also paragraph [0079]). Lao, however, does not disclose a first dimension of the block being larger than both dimensions of the cache, and a second dimension of said block being smaller than a corresponding second dimension of the cache. This is because Lao teaching is independent of the dimensions of cache. However, since the teaching of Lao is based only on the cache size and has no restriction on the cache dimensions, it would have been an obvious application, to a person of ordinary skill in the art, to implement the teaching of Lao in a computer system with a cache that the optimal partition of a matrix would result in a first dimension of the block being larger than both dimensions of the cache and a second dimension of said block being smaller than a corresponding second dimension of the cache, as long as the block is fit in the cache. For instance, it would have been an obvious application to apply the teaching of Lao, to partition the matrix A in the example in paragraph [0079] in a computer system with a cache having a size of 9 and the dimensions of 3 by 3. The partition would be the same as disclosed the example with each block having a size of 8 and dimensions being 4 by 2, since they are largest contiguous blocks but small enough to fit in the cache of size 9. The first dimension of the block which is 4 is larger than both dimensions of the cache which are both 3, and a second dimension of the block which is 2 is smaller than a corresponding second dimension of the cache as claimed.

As per claims 2,7 and 9, Lao discloses in figure 1 and its description in paragraph [0079] the execution including retrieving the data from the memory in units of said increment block (104); and executing at least one matrix subroutine using said data.

As per claim 5, since Lao discloses in page 4, paragraph [0062], that the execution may be implemented using various types of operating systems and computing platforms, it would have an obvious variation without departing from the teaching of Lao to implement the execution in a system having the cache being an L1 or L2 cache as claimed.

As per claim 6,14 and 18, load and retrieving data to and from a memory in increments of a memory line size are well known and common in the art.

As per claims 8,13,16,25 and 26, since Lao discloses an execution of matrix transposition which is often performed in LAPACK and DGEMM, a person of ordinary skill in the art would have found it an obvious application to apply the teaching of Lao in a subroutine from LAPACK or DGEMM as claimed.

As per claims 21 and 22, the claims merely recite obvious fields of use.

8. Applicant's arguments filed 08/21/2007 have been fully considered but they are not persuasive.

Regarding the rejection under 35 USC 101, it is respectfully submitted that the claimed invention merely performs manipulations and calculation of data. Since an executing a matrix subroutine itself if not applied to a practical application to produce a real world result is non-statutory subject matter regardless how it is implemented, an invention that merely stores data in a particular manner to improve a non-statutory subject matter such as the execution of a matrix

Art Unit: 2193

subroutine as claimed is thus also non statutory since it does not cause the matrix subroutine to produce a real world result. Further, the claimed invention is also non-statutory as being directed to a preemption of the claimed manipulation and calculation of data since they appear to cover every substantial practical application.

Regarding the rejection under 35 USC 103, it is submitted that although Lao does not specifically disclose a first dimension of the block being larger than a first dimensions of the cache, and a second dimension of the block being smaller than a corresponding second dimension of the cache, the feature would have been obvious to a person of ordinary skill in the art as explained in the rejection. Noting that the invention as original disclosed does not mention the cache dimensions or discloses any un expected result for having the dimensional relation between the cache and the matrix block as claimed. Further, as pointed out in the rejection, Lao clearly discloses that the guide for optimally partitioning a matrix is to use large contiguous blocks but make them small enough to fit in the, and the mentioned example clearly shows the matrix being partitioned in contiguous block as claimed.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong D. Ngo whose telephone number is (571) 272-3731. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis, Jr. A. Bullock can be reached on (571) 272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lewis A. Bullock, Jr./  
Supervisory Patent Examiner, Art Unit 2193  
06/12/2008

/Chuong D Ngo/  
Primary Examiner, Art Unit 2193